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FORMULATING STRATEGIES TO IMPROVE FOOD SAFETY OF BAKERY SMALL-MEDIUM ENTERPRISES THROUGH GOOD MANUFACTURING PRACTICE

FORMULASI STRATEGI UNTUK MENINGKATKAN KEAMANAN PANGAN INDUSTRI KECIL MENENGAH ROTI MELALUI PENERAPAN GOOD MANUFACTURING PRACTICE

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ABSTRACT

The food industry in Bogor is dominated by small enterprise (96%). Problems on small enterprise, among others, the emergence of food safety issues due to low sanitation and hygiene practices. Based on data from outbreaks (epidemics) of Indonesia in 2001-2006, it is known that the major cause of poisoning was due to microbes and were common in food products produced by small-medium enterprise (SME) and catering. The objective of this research was to formulate strategy for improving food safety based on implementation of Good Manufacturing Practices (GMP). This paper presents I-SWOT analysis regarding the implementation of GMP on bakery small-medium enterprises in Bogor. SWOT analysis for the strategic environmental factors identified the significant aspect of the supporting elements, constraints, and the groups of the alternative strategy. Complete analysis of this research resulted in five alternatives formulation strategies for improving food safety based on implementation of GMP, with considering respective limitation.

Keywords: bakery, good manufacturing practices, interpretative structural modelling, small-medium enterprises, SWOT

ABSTRAK

Struktur industri makanan di Kota Bogor didominasi oleh industri skala kecil (96%). Permasalahan pada industri kecil antara lain munculnya isu keamanan pangan karena rendahnya praktek sanitasi dan hygiene. Berdasarkan data kejadian luar biasa (KLB) tahun 2001-2006 diketahui bahwa penyebab keracunan utama adalah karena mikroba dan umumnya terjadi pada produk pangan yang dihasilkan oleh IRT (Industri Rumah Tangga) dan jasa Boga. Penelitian ini bertujuan untuk membuat perancangan strategi peningkatan mutu keamanan pangan berdasarkan praktek GMP atau cara produksi makanan yang baik. Makalah ini menyampaikan analisis I-SWOT berkenaan dengan implementasi cara produksi makanan yang baik pada perusahaan skala kecil-menengah di Bogor. Analisis SWOT untuk faktor lingkungan strategis telah mengidentifikasi aspek yang signifikan dari elemen-elemen pendukung, kendala, dan kelompok strategi alternatif. Analisis lengkap penelitian ini telah membangun perumusan lima strategi alternatif untuk meningkatkan keamanan pangan melalui penerapan GMP, dengan mempertimbangkan keterbatasan masing-masing.

Kata kunci: industri roti, cara produksi yang baik, interpretative structural modelling, industri kecil menengah, SWOT

INTRODUCTION

The need for food as one of human basic needs tends to increase due to population growth.This has spurred the development of food industry. With their second-largest contribution (27%) (in non-oil group to the national GDP (Kemenperin, 2011), food industries play a significant role in Indonesia's development. The globalization era has given effects on food industries. Food safety issue is one of them. Food contamination by microbes as a result of low sanitary and hygienic practices was one of the main problems found in food safety in Indonesia (Fardiaz, 2006).

Based on data of outbreak during 2001-2006, it was found that the main cause of food contamination was microbes and the contamination was mainly found in food products produced by home industries and catering service (BPOM, 2008). In order to ensure food safety, a food safety system including good manufacturing practice (GMP) should be implemented (Arvanitoyannis and Varzakas, 2008). GMP is a basic food processing to obtain consistent quality and safety. GMP provides basic needs to ensure that all practices related to workers, facilities and environment, equipment, and process control are good (Amoa-Awua*et al*., 2007).

The government has to guarantee that GMP is implemented in Food Production Certificate for Home Indutries (SPP-IRT) issued by a

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Regent/Mayor and Head of Regional Government. The Govermental Regulation No. 28 2004 on Food Safety, Quality, and Nutrition has given a mandate that foods produced by household industries must have SPP-IRT.

Based on data obtained from the Health Service Office of Bogor City, there are 497 industries having SPP-IRT. This is relatively a small number considering the total number of 7,305 small food industries of the city in 2011. This means that many SMEs have not had SPP-IRTs or implemented GMP. Bogor is famous for its food souvenirs/gift and of them is bakery that is why the food safety becomes an important issue and this research focus on bakery to ensure that Bogor will have strategies in improving food safety of SME bakeries.

The objective of this research is to formulate strategy for improving food safety based on implementation of Good Manufacturing Practices (GMP's). This paper presents I-SWOT analysis regarding the implementation of GMP's on bakery small-medium enterprises in Bogor. The improved safety is expected to enhance the competitiveness of SMEs' products.

MATERIALS AND METHODS

Data Collection

Primary and secondary data were used. Primary data were collected from opinion of experts of the Health Service Office, Industry and Trade Service Office, of Bogor City, Center for Agro-based Industry, bakery industries, and Faculty of Agricultural Technology, Bogor Agricultural University. In addition, primary data were also obtained from observation done in small and medium bakery industries including Elsari, Bie-bie, Kanung, Azkia, and CV Bando Bakery. The study was conducted in Bogor City from January to June 2012. While secondary data are obtained from report published by outbreaks (epidemics) of Indonesia, Ministry of Trade and Industry, BPOM, and desk study of literatures.

Methods

Strategy formulation was conducted in three stages, namely inputting, matching, and making decision. In the inputting stage, data quantification was done subjectively during the initial stage of the strategy formulation process. In this stage, company's external factors (opportunities, threats) and internal factors (strengths, weaknesses) were analyzed. Analysis was then conducted by using *External Factor Evaluation* (EFE) and *Internal Factor Evaluation* (IFE) methods.

A pairwise comparison technique was used to give weight to the internal and external factors. The weight of each strategic factor was obtained by determining the value of each strategic factor relative to the total values of all strategic factors (Kinnear and Taylor, 1991; Triantaphyllou, 1995; Terlouw*et al.,* 2009). Rating of IFE matrix was determined by giving a rate of 1 to 4 to each factor to indicate the factor as a major weakness (1), minor weakness (2), minor strength (3), and major strength (4). Rating was company-based and weighting was industry-based (David, 2009).

The matching stage was focused on the formulation of alternative strategies by taking into consideration the company's internal and external factors. This stage was done by using the Internal-External (IE) and Strengths,Weaknesses, Opportunities,Threats (SWOT) matrices (David, 2009). Then, to enrich the strategy formulation, a structural analysis of constraint, support, and actor key elements was done by using an Interpretive Structural Modelling (ISM) (Chidambaranathan, 2009).

ISM method was developed by Warfield (1973) and has been widely used to analyse structural elements based on their contextual relation with the help of computer programs (Saxena *et al.*, 1992; Ahuja *et al.,* 2009; Sagheer*et al*., 2009; Jharkharia, 2011; Sharma *et al.,* 2011). The analysis of ISM is hierarchical structure of system elements and classification of key sub-elements. Steps of ISM technique are:

1) Expert selection. In this study, three experts involved in the previous study were selected.
2) Determination of element and sub-element system which was taken from the results of SWOT identification plus actor elements.
3) Determination of contextual relation among sub-elements in the forms of V, A, X, O letters according to the following rules.
   V: i-th sub-element has a relation with j-th sub-element and j-th element has no relation with i-th sub-element, eij=1 and eji=0
   A:j-th sub-element has a relation with i-th sub-element and i-th sub-element has no relation with j-th sub-element,eij=0 and eji=1
   X : i-th sub-element has an interrelation with j-th sub-element,eij=1 and eji=1
   O: i-th sub-element has no interrelation with j-th sub-element, eij=0 and eji=0
4) The information was structured in the form of matrices called *structured self-interaction matrix* (SSIM) describing, with the help of computer programs, the contextual relation between elements and sub-elements of the system.
5) SSIM was transformed into a *reachability matrix* (RM), namely a binary matrix indicating a mathematical relation of inter-elements in the system.
6) RM was tested for its transitivity and reflectivity.If the test was not fulfilled, an adjustment was done to create a closed matrix situation (causal looping).
7) Based on their driver power and dependence, structurized key sub-elements were classified

into 4 sectors, namely *autonomous, dependent, linkaged,* and *independent.*

8) System structure was hierarchical and inter-element relation was then developed based on RM (Marimin, 2004; Attri, 2013).

The decision was formulated by using I'SWOT (ISM-SWOT) matrices. The flow chart of the study is shown on Figure .1

RESULTS AND DISCUSSION

Identification and Analysis of Internal–External Environment

Results of internal environment analysis show that there are 7 strength factors including strategic geographical location, economic basic sector, supporting laboratory infrastructure, facilities-infrastructure, policy, finance, and coordination. In addition, 7 weakness factors are identified, namely unavailable strategic plan, lack quantity and quality of human resources, lack capital, insufficient information media, and lack controlling mechanism.

Meanwhile, results of external environment analysis show that there are 5 opportunity factors including market opportunity, external supports, changed consumption pattern, information technology advances, andeducation/research institution. Four factors are identified as threats, namely competition from similar bakery products, electricity/fuel prices, substitution product development, and buyers' power. Results of weghting and scoring of combined opinions of 5 experts an IFE and EFE matrices of Bogor city are described on Table 1.

It was shown that the IFE score was 2.33 indicating that Bogor City was reasonably good at managing its internal condition. The strength factor with the highest score was SPP-IRT (2.78). Since 2010, Bogor City Health Service Office has decided to waive the SP-IRT registration fee of Rp 300,000 for SMEs. SP-IRT is a written guarantee given by the government to foods produced by household industries which have implemented GMP.

The main weaknesses in improving the implementation of GMP in SMEs in Bogor City were the facts that the controlling mechanism did not work in a regular basis and the quantity/expertise of extension workers (PKP) and superintendent (DFI) was limited.

Both factors shared the same score of 0.081. The number of active DFIs in Bogor was only 3 personnel. It was a very small number compared to the number of SP-IRT certified food industries (497) to be regularly supervised once in a year. Unavailable Local Food-Nutrition Strategic Action Plan and Industrial Development Strategic Plan (scored 0.095) was found to be the third weakness. According to WHO (1999), lack government commitment and lack expertise/technical support were among other constraints hampering the implementation of HACCP (including GMP as a pre-requisite) in SMEs.

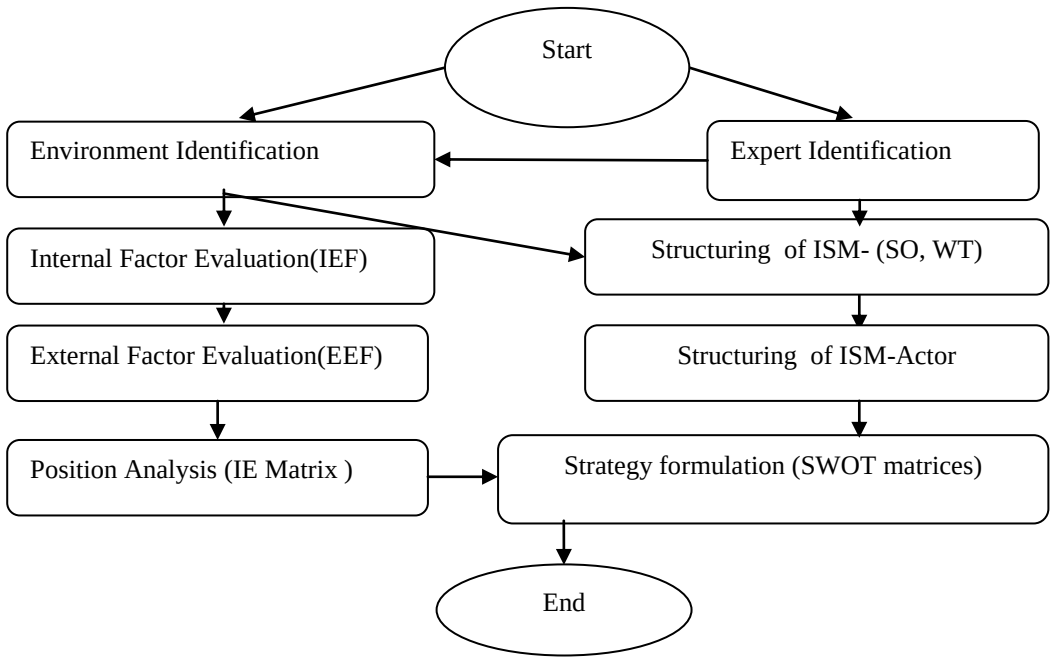


Figure 1. Flow chart of the study

Table 1. Internal factor evaluation (IFE)and external factor evaluation (EFE) matrices of Bogor City

Main Internal Factors	Weight	Rank	Weight Score
Srength			
S1. Strategic geographical location	0.052	3.6	0.186
S2 .Economic basic sector	0.066	3.8	0.251
S3. Accredited laboratory infrastructure	0.068	3.8	0.259
S4. Adequate supporting facilities and infrastructure	0.077	3.4	0.263
S5. SPP-IRT registration fee waiving policy	0.073	3.8	0.278
S6. Good regional financial sources	0.069	3.2	0.220
S7.Having an inter-SKPD network coordination	0.055	3.2	0.176
Sub Total A			1.632
Weaknesess			
W1. Unavailable strategic plan	0.068	1.4	0.095
W2. Lack quantity and expertise of PKP and FDI personnel	0.081	1	0.081
W3.Lack commitment and working culture of SMEs	0.091	1	0.091
W4. SMEs' limited capital	0.077	1.8	0.139
W5. Limited information media/publication	0.054	2	0.109
W6. Limited understanding about SMEs	0.088	1,2	0,105
W7. Irregular controlling mechanism	0.081	1	0,081
Sub Total B	0.701		
Total score weight	2.333		

Main External Factors	Weight	Rank	Weight Score
Opportunity			
O1. Potential market opportunity	0.114	4	0.457
O2. Assistance from central government	0.131	3.2	0.420
O3.Changed public consumption pattern	0.100	3.6	0.362
04. Advances in technology and information	0.088	3.8	0.334
O5. Availability of educational/ research institutions in Bogor	0.067	3.2	0.214
Sub Total C			1.787
Threat			
T1. Competition from similar bakery (franchise) / products of other cities	0.130	1.2	0.156
T2. Possible risen production cost (fuel, electricity, etc.)	0.134	1.4	0.187
T3. Development of other substituting products	0.105	1.8	0.188
T4. Buyers' power to make choice among available bakery producers	0.131	1.2	0.157
Sub Total D			0.689
Total score weight			2.476

A score of 2.48 was obtained from EFE matrices.This showed that Bogor City government was not capable enough to make use of the opportunities and minimize the threats from the external environment. The main opportunity was potential domestic market (scored 0.4567). Meanwhile, the availability of educational/research institutions in the city was the lowest opportunity (scored 0.214). Competition from similar bakery products (franchise)/products from other cities was found as the main threat (scored 0.156). Wilcock *et al*. (2011) identified some things that motivated SMEs to implement HACCP including governmental regulation, willingnes to be more successful than their competitors, and fulfilling the requirements from customers. Therefore, in addition to govermental regulation, potential market opportunity and business competition can be directed to improve the motivation of SMEs to implement GMP in order to obtain SP-IRT.

For most industries, main determination of the entire competitiveness and profitability rate in

general were the competitions among companies in industry (Umar, 2005). IE matrix for horizontal axcis showed that the position of Bogor City government in term of the implementation of GMP in small and medium bakery enterprises was in quadrant V with the coordinates of (2.33; 2.476) (Table 2). This cell position showed that the improvement of GMP implementation in small and medium bakery enterprises could be done by using keeping and maintaining strategies (David, 2009).

IE matrices were given in Table 2. It was shown that the increase in the implementation of GMP in small and medium bakery enterprises in Bogor City could be directed to maintaining the strategies that have been done by the government, including waiving the SP-IRT registration fee and giving extension and guidance, and helping SMEs' bakery products which have obtained SP-IRT with market penetration in order to maintain the existence of production which has met GMP requirements.

Table 2 . Internal-External (IE) Matrices

Total EFE Weight Score	Total IFE Weight Score: Strong 3.0-4.0	Medium 2.0-2.99	Weak 1.0-1.99
High 3.0-4.0	(I) *Grow and Build*	(II) *Grow and Build*	(II) *Hold and maintain*
Medium 2.0-2.99	(IV) *Grow and Build*	(V) *Hold and maintain*	(VI) Harvest and divest
Rendah 1,0-1,99	(VII) *Hold and maintain*	(VIII) Harvest and divest	(IX) Harvest and divest

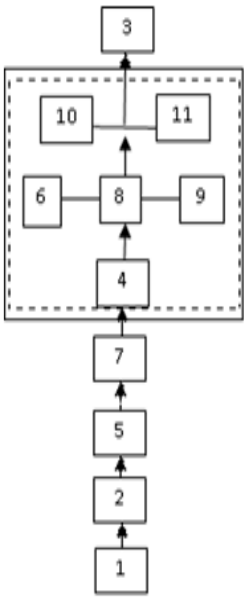
ISM (*Interpretative Structural Modelling*) Structuring

Before strategy formulation was done, an analysis by using an ISM tecnique was done to assess the contextual relation between elements and the hierarchy of the elements constructing the strategies. The selected elements included 1) constraining elements, 2) supporting elements, and 3) actor elements.

Structuring of Constraining Elements

Constraining elements and sub-elements were formulated based on the results of SWOT identifications.These were a combination of weakness and threat (WT) factors resulting in 11 sub-elements. The analysis of sub-element relation was done by using a VAXO ISM technique based on opinion of three experts with an assumption that one constraint sub-element relation causes another constraint sub-element relation. Results of ISM structuring (*transitivity* = 70%) show that there are 6 levels of hierarchy and 11 elements as shown in Figure 2.

The key constraint element was the unavailability of Local Food-Nutrition Strategic Action Plan and Industrial Development Strategic Plan prepared by Bogor City government (W1).This factor belonged to independent classification (*Strong driver –weak dependent variables)* and took the highest level (level 6) with the highest *Driver Power*value of 11 and the smallest *Dependence* value.This indicated that this key element needed main attention to be a driver of other elements.

	Constraint sub-elements (WT)		Hierarchy	Dependency: Driver Power	Dependence	Category
1	W1	Unavailability of Local Food-Nutrition and Industrial Development Strategic Plans		11	1	Independent
2	W2	Lack quantity and expertise of PKP and FDI personnel		10	2	Independent
3	W3	Lack commitment of SMEs		1	11	Dependent
4	W4	SMEs' limited capital		7	10	Linkage
5	W5	Limited information, publication		9	3	Independent
6	W6	Limited knowledge of SMEs' workers		7	10	Linkage
7	W7	Irregular surveillance mechanism		8	4	Independent
8	T1	Competition from similar bakery (franchise) / products of other cities		7	10	Linkage
9	T2	Risen production cost		7	10	Linkage
10	T3	Development of other substituting products		7	10	Linkage
11	T4	Buyers' power to make choice		7	10	Linkage

Key constraint sub-elements: Unavailable Strategic Plans (W1)

Figure 2. Hierarchical structure and key constraint elements

Structuring of Supporting Elements

Supporting elements and sub-elements were formulated based on the results of SWOT identification. These were a combination of strength and opportunity (SO) factors resulting in 12 sub-elements. Results of ISM structuring (transitivity = 75%) showed that there were 5 levels of hierarchy at Figure 3.

Strategic location of Bogor City (S1), adequate facilities and infrastructure (S4), potentialmarket opportunity (O1), consumers' changed consumption pattern and healthy life awareness (O3),and technology and information (O4) were *independent factors.*Variables in this sector were independent variables and key elements in the hierarchy.The availability of research institutions in Bogor City (O5) was positioned in the autonomous sector *(weak driver–weak dependent variables).* Variables in this sector were assumed to have minor relation with the objective.

Structuring of Actors

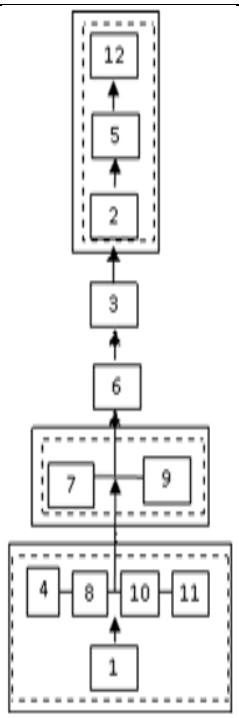
Results of in-depth interview with experts and actors showed that 10 actors were identified as related to the implementation of GMP in small and medium bakery enterprises in Bogor City as shown in Figure 4.

Results of ISM analysis showed that Regional Planning Board (Bapeda) (P1) was the most influencing key element followed by Health Service Office (P2), Industry and Trade Service Office (P3), and higher education institutions (P5) as independent factors.SME owners (P9) and SME employees (P10) found to have the highest dependence and lowest driving power belonged to the dependent factors. This indicated that in order to implement GMP, SME owners and SME employees need a driving power from key actors, namely the local government, in this case, P1, P2, and P3.

Strategy Formulation (I'SWOT Matrices)

Strategies for Bogor City government to improve the implementation of GMP in small and medium bakery enterprises are shown in Table 3.

Strengths and weaknesses are put on the horizontal axis and opportunities and threats on vertical axis. SWOT analysis consists of four alternativestrategies namely SO (Strengths–Opportunities), WO (Weaknesses-Opportunities), S (Strengths-Threats), and WT(Weaknesses-Threats). The selected elements were key elements resulted from ISM analysis and IEF-EEF matrices. By taking into consideration the results of SWOT matrices and ISM structuring, two groups of strategies were proposed as follows.

	Supporting sub-elements (SO)		Hierarchy	Dependency Driver Power	Dependency Depen-dence	Category
1	S1	Strategic location of Bogor City		11	5	Independent
2	S2	Food Industries become a sector based on economy		1	10	Dependent
3	S3	Has accredited testing laboratories		2	9	Dependent
4	S4	Adequate support of facilities and infrastructure		11	5	Independent
5	S5	SP-IRT Registration Fee Waiving Policy		1	9	Dependent
6	S6	HDI and GDP index is quite good		4	8	Dependent
7	S7	Has a network of coordination across SKPD		6	7	Linkage
8	O1	Potential Market Opportunity		11	5	Independent
9	O2	Assistance from Central Government		6	7	Linkage
10	O3	Changes in consumption patterns and awareness of healthy living		11	5	Independent
11	O4	development of technology and information		11	5	Independent
12	O5	existence of research institutions / education in Bogor		1	1	Autonomous

Key supporting sub-elements: S1, S4, O1, O3, O4

Figure 3. Hierarchical structure and key supporting elements

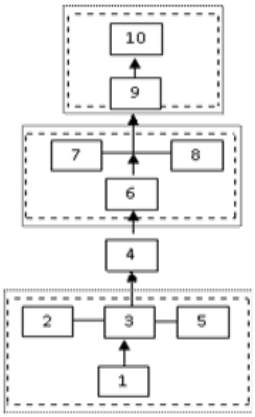
	Actor sub-elements		Hierarchy	Dependency: Driver Power	Dependency: Dependence	Category
1	P1	Regional Planning Board		10	4	Independent
2	P2	Regional Health Service Office		10	4	Independent
3	P3	Industry and Trade Service Office		10	4	Independent
4	P4	Industry Association		6	5	Linkage
5	P5	Research/Higher Education Institution		10	4	Independent
6	P6	Food Safety Extension Worker		5	8	Dependent
7	P7	Inspection Superintendent Personnel		5	8	Dependent
8	P8	Consumers/Public		5	8	Dependent
9	P9	SME owners		1	9	Dependent
10	P10	SME employees		1	9	Dependent
			Actor Key Elements: P1,P2, P3, P4, P5			

Figure 4. Hierarchical structure and key actor factors

Table 3. Strategies by using I'SWOT matrices

		S	Strengths	W	Weaknesses
		S1	Bogor City Strategic location	W1	Unavailable Local Food-Nutrition Strategic Action Plan and Industrial Development Strategic Plan
		S4	Adequate support of facilities and infrastructure		
		S5	SP-IRT Registration Fee Waiving Policy	W2	Lack quantity and expertise of PKP and FDI personnel
				W3	Lack commitment and working culture of SMEs
				W7	Controlling mechanism does not run
O	**Opportunities**		**S-O Strategies**		**W-O Strategies**
O1	Potential Market Opportunity	1	Creating a "Promotional Area of Healthy Safe Original Bogor Foods" in a strategic area for SP-IRT certified bakery products of SMEs.	1	Creating a planned training program for food safety extension workers (PKP) and food controlling personnel (DFI).
O2	Assistance from Central Government	2	Keeping the SP-IRT registration fee waiving policy.	2	Conducting periodic annual control.
		3	Directing government's assistance in a planned, sustainable, and gradual way (S4,O2)	3	Intensive guidance for small and medium bakery enterprises
T	**Threats**		**S-T Strategies**		**W-T Strategies**
T1	Competition from similar bakery (franchise) / products of other cities	1	Fasilitating SME assosiation to gain power and cooperation (t1)	1	Creating a Local Food-Nutrition Strategic Action Plan and Industrial Development Strategic Plan.
T4	Buyers have power to make choice	2	Facilitating the improvement of design and innovation of label and packaging of bakery products of SMEs (t1,t4)	2	Developing partnership programs with State-owned Enterprises (BUMN)/banks to fasilitate small and medium bakery enterprises with softloans/capital.

Strength-Based Strategies

Results of IEF matrices show that the policy of Bogor City government to waive the SP-IRT registration fee is the main power. Results of ISM structuring show that the key elements of supporting factors owned by Bogor City were the strategic location of Bogor City, adequate support of facilities and infrastructure, potential domestic market opportunities, consumers' changed consumption pattern and healthy life awareness, and the use of technology and information.Therefore, by taking into account the strengths owned by Bogor City government, the following strategies were selected.

1. Creating a "Promotional Area of Healthy Safe Original Bogor Foods" in a strategic area for SP-

IRT certified bakery products of SMEs. Because of consumers behavior that starting to value health therefore a success of area of healthy food can become an attractive for other SME that not yet received SP-IRT to increasingly keen to get it.
2. Keeping the SP-IRT registration fee waiving policy.SME will find it interesting because they will not expends more fee thus keep the cost of production low.

Weakness-Based Strategies

The main weakness factors found in IEF matrices were irregular controlling mechanism, limited quantity and expertise of extension workers (PKP) and superintendents (DFI). Results of ISM structuring show that the key elements of constraining factors for the improvement of GMP implementation in small and medium bakery enterprises is the unavailability of Local Food-Nutrition Strategic Action Plan and Industrial Development Strategic Plan.Therefore, by taking into account the weaknesses owned by Bogor City government, the following strategies were selected.

1. Creating a Local Food-Nutrition Strategic Action Plan and Industrial Development Strategic Plan. Action plan and strategic plan includes deciding who is going to do what and by when and in what order for the government of Bogor city to reach its strategic goals.
2. Creating a planned training programfor food safety extension workers (PKP) and food controlling personnel (DFI). Lack of officers is a great obstacle to ensure monitoring and evaluation of GMP in SME therefore government of Bogor city need to train more officer to ensure that they can monitor and evaluate all of the SMEs.
3. Conducting periodic annual control. Controlling is an important steps to ensure everything stay on course. It is better to control and avoid problems rather than fixing problem.

CONCLUSIONS AND RECOMMENDATION

Conclusions

The resulting strategies to improve safety quality of bakery small-medium enterprises through good manufacturing practicesare directed to maintain the SP-PIRT registration fee waiving policy, and giving extension and guidance, and helping SMEs' bakery products which have obtained SP-IRT with market penetration in order to maintain the existence of production which has met GMP requirements.

The key elements of actors influencing the implementation of GMP in small and medium bakery enterprises were Regional Planning Board, Health Service Office, Industry and Trade Service Office of Bogor City, and higher education institutions.

The key elements of the constraining factors influencing the improvement of GMP implementation in small and medium bakery enterprises were the unavailability of Local Food-Nutrition Strategic Action Plan and Industrial Development Strategic Plan made by Bogor City government.

The key elements of the supporting factors influencing the improvement of GMP implementation in small and medium bakery enterprises were the strategic location of Bogor City, adequate support of facilities and infrastructure, potential market opportunity, consumers' changed consumption pattern and healthy life awareness, and the use of technology and information.

Based on the I'SWOT results, there were 5 selected strategies to be proposed to Bogor City government in order to improve the food safety of the products of small and medium bakery enterprises through GMP implementation. They are 1) Creating a "Promotional Area of Healthy Safe Original Bogor Foods" in a strategic area for SP-IRT certified bakery products of SMEs, 2) Keeping the SP-IRT registration fee waiving policy, 3) Creating a Local Food-Nutrition Strategic Action Plan and Industrial Development Strategic Plan,4) Creating a planned training program for food safety extension workers (PKP) and food controlling personnel (DFI), and 5) Conducting periodic annual control.

Recommendation

The recommendation for further research is to apply this methodology for the other food manufacturing products, because food industry produce consumable goods and directly related to consumers therefore safety is a main priority. The ISM can also be integrated with the others techniques belong to artificial intelligence of natural computation to increase its capability by using support from advanced technology.

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